REMARKS

This Amendment is responsive to the final Office Action dated February 21, 2008. This Amendment is submitted with a Request for Continued Examination (RCE) and constitutes the required submission. Applicant has amended claims 1, 18, 24–26, 35, and 51, and added claims 60-65. Claims 1–10, 12–27, 29–43, 45–51, and 53–65 will be pending upon entry of this Amendment.

Amendments to the Specification

Applicant has amended paragraph [0054] of the originally-filed disclosure to describe determining whether the input voltage V_IN is greater than the threshold voltage V_TH. Support for this amendment may be found, for example, at FIG. 8 as originally filed, which illustrates a "greater than" notation (>). Consistent with this amendment, paragraph [0054] as originally filed already describes determining whether the input voltage V_IN exceeds the threshold voltage V_TH. No new matter has been added by way of this amendment.

Claim Rejection Under 35 U.S.C. § 102

In the final Office Action, claims 1, 2, 10, 14, 17–19, 27, 31, 34–36, 43, 47, 50, and 59 were rejected under 35 U.S.C. § 102(e) as being anticipated by Lebel et al. (U.S. Patent Application Publication No. 2003/0065370, hereinafter referred to as "Lebel").

Applicant respectfully traverses the rejection to the extent such rejection may be considered applicable to the amended claims. Lebel fails to disclose each and every feature of the claimed invention, as required by 35 U.S.C. § 102(e), and provides no teaching that would have suggested the desirability of modification to include such features.

For example, with respect to independent claim 1 as amended, Lebel fails to disclose or suggest a programmer for a medical device, the programmer comprising a wireless telemetry circuit adapted to communicate with the medical device, a boost converter adapted to convert a battery voltage to an operating voltage for the programmer, and a control circuit adapted to inhibit pulse skipping by the boost converter when a level of the battery voltage is greater than a threshold voltage.

Lebel describes a DC-DC up-converter 734 that produces a boosted voltage signal.[1] Under a light load, the up-converter utilizes a burst mode, resulting in a wider noise spectrum.[2] Lebel discloses that the up-converter is shielded from other components to minimize negative effects that may result, such as, for example, on telemetry reception.[3] Although Lebel appears to generally recognize possible noise issues that may arise from a boost converter, Lebel provides no teaching whatsoever of a pulse skipping boost converter, nor particular noise issues that may be attributable to the pulse skipping operation of such a boost converter.

Instead, Lebel describes utilizing a burst mode operation of the up-converter to yield a wider noise spectrum, and shielding the up-converter from other components. Hence, the up-converter described by Lebel is a burst mode converter, and not a pulse skipping boost converter. In the absence of a pulse skipping mode in up-converter 734, Lebel cannot possibly contemplate a control circuit adapted to inhibit pulse skipping by such a boost converter, as recited in Applicant's claim 1.

In support of the rejection of independent claim 1, the Office Action stated that Lebel discloses deactivating the up-converter 734 when a battery voltage falls below a threshold, which the Office Action alleged met the limitation of pulse skipping because no pulses are provided.[4] The Office Action also asserted that the up-converter inhibits pulse skipping when the battery voltage is above a threshold because the active boost converter is operable and provides pulses.[5] In the Response to Arguments section, the Office Action advanced the argument that providing pulses is the same as the double negative inhibiting pulse skipping.[6] Applicant respectfully disagrees with this assertion.

The interpretations of "pulse skipping" and "inhibiting pulse skipping" provided by the Office Action are unreasonable and inconsistent with both Applicant's disclosure and the knowledge of those skilled in the art of boost converter design. As is well-known, claims must

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[1] Lebel at paragraph [0235].
[2] *Id.*
[3] *Id.*
[4] Office Action dated 2/21/08 at p. 2, item 3.
[5] *Id.*
[6] *Id.* at p. 7, item 19.

be given their broadest reasonable interpretation consistent with the specification.[7] However, the Examiner's interpretation is both inconsistent with the specification and unreasonable. In promoting an exceedingly broad interpretation, the Examiner has ignored both Applicant's specification and the knowledge and understanding of one skilled in the art of boost converter design.

As described in further detail below, activating the Lebel up-converter to actually deliver charging pulses does not in any way amount to inhibiting pulse skipping, as the Lebel device is not preconditioned to skip any pulses during normal operation. Moreover, completely deactivating the Lebel up-converter to deliver no charging pulses does not in any way amount to performing in a pulse skipping mode of the up-converter. Again, the Lebel up-converter does not even have a pulse skipping mode. The interpretations applied to "pulse skipping" (deactivating an up-converter) and "inhibiting pulse skipping" (activating the up-converter) by the Office Action are unreasonable. As understood by those skilled in the art, pulse skipping in a boost converter refers to an operational mode in which the boost converter skips one or more pulses among a series of pulses delivered to produce an output voltage.

In the Response to Arguments, the Office Action stated that Applicant's argument that "deactivating the up-converter indefinitely is not skipping . . . places limitations on the terms that are neither claimed, nor provided in a 'special definition' in the specification."[8] On this basis, the Examiner stated that "[a]s such, they will be afforded their common usage."[9] The Examiner's position is in error. First, Applicant have provided a definition of pulse skipping that is consistent with common usage. Second, the Examiner's perception of common usage, insofar as the term "pulse skipping" is concerned, is inconsistent with common usage in the boost converter arts. Therefore, Applicant respectfully disagrees with the "common usage" interpretation applied to the terms "pulse skipping" and "inhibiting pulse skipping." The "common usage" attributed to the claim terms is inconsistent with Applicant's specification, as well as with common usage in the art, which is impermissible.[10]

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[7] *See* MPEP 2106 and 2111.
[8] Office Action dated 2/21/08 at p. 7, item 19.
[9] *Id.*
[10] *See* MPEP 2106 and 2111.

In Lebel, a main battery supplies a main battery voltage signal to a DC-DC up-converter to produce a boosted voltage signal.[11] When the main battery voltage signal falls below a threshold, the main battery and the up-converter coupled to the main battery are deactivated and the back-up battery is activated.[12] Therefore, the up-converter of Lebel is operational when the main battery voltage signal is above the threshold and non-operational when the main battery voltage signal is below the threshold.

Lebel fails to describe a control circuit that modifies the operation of a boost converter in any way based on a comparison of a battery voltage to a threshold voltage, much less based on a determination that the battery voltage exceeds a threshold voltage. In Lebel, a main battery supplies a main battery voltage signal to a DC-DC up-converter 734 to produce a boosted voltage signal. According to the Office Action, the DC-DC up-converter 734 is deactivated, i.e., simply stops up-converting voltage, when the battery input voltage is too low to support operation of the external device.[13] Completely deactivating the up-converter based on a comparison of the main battery voltage to a threshold voltage cannot reasonably be characterized as modifying an operational feature of the up-converter, i.e., inhibiting pulse skipping by a boost converter when a level of the battery voltage is greater than a threshold voltage, as required by Applicant's claim 1.

Lebel does not contemplate actively inhibiting an operational feature of a boost converter, much less pulse skipping, while the boost converter is operating in its capacity as a boost converter. More specifically, Lebel does not disclose or suggest that operation of the boost converter is actively inhibited when the up-converter is operational, so as to prevent the boost converter from entering a particular operational mode such as pulse skipping. Indeed, Lebel does not even describe pulse skipping, and instead discloses a fundamentally different type of boost converter having a burst mode of operation. The fact that the up-converter of Lebel delivers pulses when the up-converter is operational does not disclose or suggest that pulse skipping is inhibited, as there is no pulse skipping. Pulse skipping is a specific feature employed by a class of boost converters such as that recited in Applicant's claim 1.

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[11] Lebel at paragraph [0235].
[12] *Id.* at paragraphs [0237] and [0245].
[13] Office Action dated 2/21/08 at p. 2, item 3 and Lebel at paragraph [0245].

As described in Applicant's disclosure, a switching mode boost converter may have a switching frequency selected to minimize effects of noise generated by the switching circuitry.[14] To improve efficiency, the boost converter may have a pulse skipping mode in which the boost converter stops switching for brief periods of time, e.g., when the input voltage and output voltage of the boost converter are close to one another, to allow an output capacitor to discharge to a desired voltage level.[15] For example, the pulse skipping feature of the boost converter may cause the boost converter to skip one or more switching cycles, i.e., pulses.[16] If the input voltage too high, such as when a "fresh" battery is installed, the boost convert may enter the pulse skipping mode more frequently, which may create substantial switching noise that can undermine telemetry performance in a medical device.[17]

Lebel discloses completely deactivating the up-converter when a main battery voltage signal (VAA) falls below a threshold value.[18] Deactivation of the up-converter operation does not amount to activation or deactivation of an operational feature of the up-converter, such as pulse skipping, during normal operation of the up-converter. In Lebel, when the up-converter is not operational, none of its operational features appear to be active. Thus, a particular feature of the device simply cannot be activated or inhibited if the device itself is non-operational, i.e., deactivated. The Office Action's argument that pulse skipping is inhibited when a level of the battery voltage is greater than a threshold voltage seems to logically rely on the assertion that pulse skipping is activated when the up-converter is deactivated. However, pulse skipping is not activated when the up-converter is deactivated because the Lebel up-converter and all of its operational features appear to be completely deactivated.

For similar reasons discussed above with respect to independent claim 1, Lebel fails to disclose or suggest each and every element of independent claims 18 and 35. For example, Lebel fails to disclose or suggest a method for controlling a power supply in a programmer for a medical device, the method comprising applying a battery voltage to a boost converter to convert

[14] Applicant's disclosure at paragraph [0037].
[15] *Id.*
[16] *Id.* at paragraph [0047]
[17] *Id.* at paragraph [0043].
[18] Lebel at paragraph [0245].

the battery voltage to an operating voltage for the programmer and inhibiting pulse skipping by the boost converter when a level of the battery voltage exceeds a threshold voltage, as recited by independent claim 18. While Applicant has amended claim 18 to recite "greater than," Applicant does not acquiesce in any way to the Office Action's interpretation of the term, "exceeds." Applicant maintains that the Office Action's interpretation of the term "exceeds" is unreasonable and inconsistent with both Applicant's disclosure and common usage.

Lebel fails to disclose or suggest a system for controlling a power supply in a programmer for a medical device, the system comprising means for applying a battery voltage to a boost converter to convert the battery voltage to an operating voltage for the programmer and means for inhibiting pulse skipping by the boost converter when a level of the battery voltage exceeds a threshold voltage, as recited by independent claim 35.

Lebel also fails to disclose or suggest each and every limitation of Applicant's dependent claims 2, 10, 14, 17, 19, 27, 31, 34, 36, 43, 47, 50, and 59. For example, Lebel fails to disclose or suggest activating pulse skipping when the operating voltage exceeds a reference voltage, as recited by dependent claims 2, 19 and 36.

The Office Action characterized the reset signal 556 in Lebel as an operating voltage on the basis that the reset signal 556 is a voltage at least indirectly provided by the up-converter, which powers the device.[19] Applicant disagrees that the reset signal 556 is an operating voltage. Independent claims 1, 18 and 35 require a boost converter to convert a battery voltage to an operating voltage. Dependent claims 2, 19, and 36 further require activating pulse skipping based on the operating voltage, i.e., the voltage that the boost converter converted from the battery voltage applied to the battery voltage. On the other hand, the high reset signal 556 disclosed by Lebel is not a voltage converted by the boost converter and, therefore, does not meet the requirements of the operating voltage recited in dependent claims 2, 19, and 36.

Lebel discloses that a comparator (an integrated circuit) monitors the voltage signal of the main battery.[20] The high reset signal 556 is an output provided by the comparator, and is sent to the processor as a power-fail interrupt signal.[21] Thus, the high reset signal 556 is not provided by the up-converter, but, rather, is determined based on the main battery voltage signal, i.e., the

[19] Office Action dated 2/21/08 at pp. 2–3, item 4.
[20] Lebel at paragraph [0243].
[21] *Id.*

signal that is inputted into the up-converter to generate the operating voltage. Accordingly, for this reason and because Lebel does not even contemplate pulse skipping, Lebel fails to disclose or suggest activating pulse skipping when the operating voltage exceeds a reference voltage.

Lebel fails to disclose each and every limitation set forth in claims 1, 2, 10, 14, 17–19, 27, 31, 34–36, 43, 47, 50, and 59. For at least these reasons, the Office Action has failed to establish a prima facie case of anticipation of Applicant's claims 1, 2, 10, 14, 17–19, 27, 31, 34–36, 43, 47, 50, and 59 under 35 U.S.C. § 102(e). Reconsideration and withdrawal of this rejection is respectfully requested.

Claim Rejection Under 35 U.S.C. § 103

In the final Office Action, claims 1–10, 12–27, 29–43, 45–51, and 53–59 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Kotowski et al. (U.S. Patent No. 6,055,168, hereinafter referred to as "Kotowski") in view of Lebel.

Applicant respectfully traverses the rejection to the extent the rejection may be considered applicable to the claims as amended. The applied references fail to disclose or suggest the inventions defined by Applicant's claims, and provide no teaching that would have suggested the desirability of modification to arrive at the claimed invention.

In support of the rejection of independent claims 1, 18, 35, and 51, the Office Action stated that Kotowski discloses a boost converter to convert a battery voltage to an operating voltage and a control circuit to inhibit pulse skipping by the boost converter when the level of battery voltage exceeds a threshold value.[22] The Office Action also reasoned that it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Kotowski by providing the voltage converter to a handheld programmer having an internal antenna in combination with a neurostimulator because Lebel teaches a handheld programmer that utilizes a boost converter.[23] Applicant respectfully disagrees with the Office Action's conclusion of obviousness.

The Office Action also stated the term "exceed" "does not necessarily mean 'be greater than,' (but merely 'go beyond limits,' thus including a lower limit)."[24] Applicant strongly

[22] Office Action dated 2/21/08 at p. 4, item 12.
[23] *Id.* at pp. 4–5, item 12.
[24] *Id.* at p. 8, item 21.

disagrees with this assertion. However, in order to advance prosecution, Applicant has amended independent claims 1, 18, 35, and 51 to clarify that pulse skipping is inhibited when a level of the battery voltage is greater than a threshold voltage. Support for the amendments to claims 1, 18, 35, and 51 may be found throughout Applicant's disclosure, including FIG. 8, which illustrates a "greater than" notation (>).

Kotowski fails to disclose or suggest a programmer comprising a boost converter and a control circuit adapted to inhibit pulse skipping by the boost converter when a battery voltage provided by a battery source is greater than a threshold voltage, as required by Applicant's claim 1 as amended. Instead, Kotowski discloses providing a "pump" signal, which the Office Action characterized as inhibiting pulse skipping,[25] when an output voltage of a switched capacitor circuit is less than a desired output.

Kotowski describes a switched capacitor circuit that receives an unregulated voltage (e.g., from a battery) and outputs a regulated voltage to an electronic device or load.[26] The gain of the switched capacitor circuit is selected based on a desired output voltage or load current and must also be greater than a minimum gain needed to ensure that the desired output voltage is met or exceeded.[27] The minimum gain is determined from the input voltage of the switched capacitor circuit.[28] The Office Action found that because the input voltage is used to select the minimum gain based on a number of thresholds and the minimum gain is used to inhibit pulse skipping, the disclosed pulse skipping is inhibited when the battery voltage exceeds a threshold.[29] Applicant disagrees with this analysis.

In Kotowski, the minimum gain is not used to inhibit pulse skipping by the switched capacitor circuit. Kotowski discloses that a comparator compares the output voltage of the switched capacitor circuit to the desired output.[30] According to Kotowski, if the output voltage is less than the desired output, the comparator sends a "pump" signal to the switched capacitor circuit to indicate that more current is needed.[31] In response to receiving the "pump" signal, the

[25] *Id.* at p. 4, item 12.
[26] Kotowski at col. 3, ll. 10–19.
[27] *Id.* at col. 3, l. 9 to col. 4, l. 8.
[28] *Id.* at col. 3, l. 9 to col. 4, l. 8.
[29] Office Action dated 2/21/08 at p. 4, item 12.
[30] Kotowski at col. 3, ll. 36–55.
[31] *Id.* at col. 3, ll. 26–30.

switched capacitor circuit maintains the frequency of clock pulses, i.e., does not skip a clock pulse.[32] If the output voltage is greater than or equal to the desired output, the comparator sends a skip signal to the switched capacitor circuit to indicate that the output voltage is sufficient and the switched capacitor circuit should not transfer any more charge to the output, i.e., the switched capacitor circuit should skip a clock pulse.[33] Thus, if the output voltage of the switched capacitor circuit exceeds a threshold, the switched capacitor skips a clock pulse, which seems generally consistent with a standard pulse skipping operation. In contrast, Applicant's independent claims require the boost converter to inhibit pulse skipping when a level of a battery voltage is greater than a threshold voltage. Whereas Kotowski considers the output voltage for purposes of pulse skipping, the claimed invention considers the battery voltage for purposes of inhibiting pulse skipping. Hence, the Examiner's analysis of Kotowski seems antithetical to the requirements of Applicant's claims.

Kotowski also describes a filter that monitors the number of pulse and skip signals and adjusts the gain of the switched capacitor circuit based on the trend of the output voltages.[34] For example, if a consecutive number of "pump" signals are detected, the gain is increased. Likewise, if a consecutive number of "skip" signals are detected, the gain is decreased. Regardless of the number of consecutive "skip" signals, the gain is not allowed to decrease below a minimum gain. According to Kotowski, the minimum gain is the minimum gain needed to ensure that the desired output voltage is met or exceeded. The value of the minimum gain is based on the voltage input into the switched array circuit, the desired output voltage, and the gain configurations allowed by the switched array circuit.[35]

The Office Action stated that when the actual gain reaches the minimum gain, pulse skipping will be increased, because the gain cannot be further reduced past the minimum gain. The Office Action concluded that Kotowski discloses that any number of consecutive pulse skips will be allowed.[36] On this basis, the Office Action reasoned that Kotowski teaches inhibiting pulse skipping when the battery voltage exceeds a threshold, i.e., a threshold used to select the

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[32] *Id.*
[33] *Id.* at col. 3, ll. 19–35.
[34] *Id.* at col. 3, ll. 36–44.
[35] *Id.* at col. 3, ll. 60–65.
[36] Office Action dated 2/21/08 at p. 8, item 21.

minimum gain configuration. However, Kotowski describes allowing pulse skipping when the gain reaches the minimum gain. As acknowledged in the Office Action, if the gain is reduced to the minimum gain, pulse skipping may increase because the gain is prevented from lowering below the minimum gain.[37] In this manner, the minimum gain may promote pulse skipping rather than inhibit it.

For at least these reasons, Kotowski does not provide any suggestion of inhibiting pulse skipping when a level of battery voltage is greater than a threshold voltage, as recited by claim 1. As established above, Lebel also fails to disclose or suggest the control circuit recited in claim 1. Accordingly, claim 1 is patentable over Kotowski in view of Lebel.

For at least the reasons discussed above with respect to independent claim 1, Kotowski in view of Lebel also fails to disclose or suggest a method comprising applying a battery voltage to a boost converter to convert the battery voltage to an operating voltage for the programmer and inhibiting pulse skipping by the boost converter when a level of the battery voltage is greater than a threshold voltage, as recited by independent claim 18. In addition, for at least the reasons discussed above with respect to independent claim 1, independent claims 35 and 51 are patentable over Kotowski in view of Lebel.

Dependent claims 2–10, 12, 13, 15–17, 19–27, 29, 30, 32–34, 36–43, 45, 46, 48–50, 53, 54, and 56–59 are also patentable over Kotowski in view of Lebel. For example, with respect to claims 13, 30, 46 and 54, the applied references fail to disclose or suggest inhibiting pulse skipping by the boost converter by limiting the level of the battery voltage applied to the boost converter. The Office Action asserted that FIG. 5 of Kotowski discloses the limitations of claims 13, 30, 46, and 54.[38] As illustrated in FIG. 3 of Kotowski, the switched capacitor array 310 is a component of DC-DC converter 300 and an input voltage from a battery is input to the switched capacitor array 310.[39] Kotowski does not disclose or suggest that the level of battery voltage inputted into converter 300 may be limited. Instead, Kotowski discloses that capacitor array 310 within converter 300 merely receives the input voltage from the battery. While Kotowski discloses that the gain of capacitor array 310 within converter 300 may be adjusted, Kotowski does not disclose that the level of battery voltage inputted into converter 300 may be limited.

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[37] *Id.*
[38] *Id.* at p. 5, item 15.
[39] Kotowski at FIG. 3 and col. 5, ll. 23–28.

FIG. 5 illustrates another embodiment of a capacitor array, and similarly fails to illustrate that the input voltage Vin for the capacitor array may be limited.

For at least these reasons, the Office Action has failed to establish a prima facie case for non-patentability of Applicant's claims 1–10, 12–27, 29–43, 45–51, and 53–59 under 35 U.S.C. § 103(a). Reconsideration and withdrawal of this rejection is respectfully requested.

New Claims

Applicant has added claims 60–65 to the pending application. The applied references fail to disclose or suggest the inventions defined by Applicant's new claims, and provide no teaching that would have suggested the desirability of modification to arrive at the claimed inventions. No new matter has been added by the new claims.

CONCLUSION

All claims in this application are in condition for allowance. Applicant respectfully requests reconsideration and prompt allowance of all pending claims.

In view of the clear distinctions identified above between the current claims and the applied prior art, Applicant reserves further comment at this time regarding any other features of the independent or dependent claims. However, Applicant does not necessarily admit or acquiesce in any of the rejections or the Examiner's interpretations of the applied references. Applicant reserves the right to present additional arguments with respect to any of the independent or dependent claims.

Please charge any additional fees or credit any overpayment to deposit account number 50-1778. The Examiner is invited to telephone the below-signed attorney to discuss this application.

Date: June 23, 2008

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